Chapter 2
Literature Review

2.1 Genesis of TQM

Increasing consumer consciousness of quality, rapid technology transfer, globalization and low cost competition, unprecedented innovation in processes and products have necessitated the organizations irrespective of their size to imbibe dramatic changes in business environment to ensure sustainability (Arumugam et al., 2009, and Singh, 2011). These changes have been characterized by focus towards cost reduction, quality improvement, better customer relationship, and delivery in time minimization. Simple inspection activities have been replaced or supplemented by quality control and quality assurance standards (Singh, 2011).

Among the above changes the fourth level of change is the Total Quality Management (TQM). TQM has been successful as a system for improving the performance of corporations and customer satisfaction and are an integrated management philosophy and a set of practices that emphasizes continuous improvement, meeting customers’ requirements, reducing rework, and ultimately shaping the long-range thinking (Lagrosen, 2001; and Yang 2005). TQM has proved to increase employee involvement and teamwork, process redesign, competitive benchmarking, team-based problem solving, constant measurement of results and closer relationships with suppliers (Singh, 2011). Kumar et al. (2009), state that TQM has established itself as one of the most popular and holistic approaches that seeks to integrate all organizational functions to focus on meeting customer needs and organizational objectives, and hence, it is practiced worldwide for gaining the competitive advantage.

Vouzas and Psyhogios (2007) have identified the soft and hard elements of TQM. The soft side of TQM includes management concepts and principles such as leadership, employee empowerment and culture, while the hard side element refers to quality improvement tools and techniques. The company’s market position is primarily influenced by the soft TQM elements and secondarily by the hard TQM elements (Fotopoulos and Psomas, 2009). TQM is associated with certain cost
element attached to it and is adopted mainly in large manufacturing organizations, and little attention has been paid to their implementation in small, medium and micro sized organizations (Seth and Tripathi, 2005). Having realized the importance of soft aspects of TQM in its success many researchers started identifying the Critical Success Factors (CSFs) for TQM implementation (Salaheldin, 2009). Some of the CSFs identified are top management commitment, continuous improvement systems, measurement and feedback, improvement tools and techniques, supplier quality assurance, human resource development, systems and processes, resources, education and training, and work environment and culture. Pinho (2008) has taken a different approach and laid emphasis on identification of TQM components impacting performance and consumer orientation. According to him measuring results, quality assurance systems, training programs, and leadership initiatives play an important role in TQM performance.

A large group of researchers have identified that for successful implementation of TQM, the selection of appropriate critical factors and developing a structural relationship among them is very important (Motwani, 2001; Seth & Tripathi, 2005; Singh et al. 2007; Salaheldin, 2009; and Singh, 2011). So, having realized the importance of adding to the body of knowledge in this direction, this is an exploratory research seeking relationships between these critical factors and the business performance with specific focus to the Indian construction industry.

2.2 Historical Evolution of TQM Research

Scientific Management movement, in the early 90s by Frederick Taylor, founder of the "one best way" method as a set of scientific principles to measure the efficiency and productivity forms the basis for all management initiatives. Taylor based his principles on four basic tasks: (1) The development of standards; (2) The fitting of a worker to a specific task; (3) The provision of means to encourage each worker to best utilization of his ability; and (4) The organization controls the various phases of a project (Robert, 2005). In the late 80s, the quality improvement movement and its potential impact on organizational theory and practice, often under the banner of TQM, appear to have several parallels with Taylor's principles (Kronenberg & Loeffler, 1991). Then came Dr. W. Edwards Deming, 'the man who discovered quality' with his principles with a focus on the customer (Gabor, 1992).
The literature presents so many definitions and descriptions of TQM that sometimes it seems as if each author has its own definition and each organisation has its own implementation (Watson & Korukonda, 1995). However, no TQM discussion is complete without acknowledging the work of the five best known TQM experts, or 'quality gurus': Deming, Juran, Feigenbaum, Crosby and Ishikawa.

Reed, et al., (2000) systematically reviewed the work and ideas of these TQM experts: Deming (1982, 1986, 2000), Juran (1988, 1989,), Crosby (1979, 1996), Feigenbaum (1991), and Ishikawa (1985) and pointed out the shared similarities on TQM elements. This review revealed that they all agreed on the importance of the following six key elements: customer satisfaction, cost reduction, leadership and top management commitment, training and education, teamwork, and organisational culture.

Hoang et al., (2010) have found the focus of each of the gurus of TQM. Feigenbaum, Ishikawa, and Juran stressed product design, Deming and Crosby did not. With the exception of Crosby, all mentioned planning, but each dealt with different aspects of it. Juran covered all facets of planning, Deming was concerned mostly with the stages of planned action, while Feigenbaum and Ishikawa focused on feedback and control. So the focus of different contributors of TQM was also different.

The TQM evolution is basically a three stage model, which started developing from the early 50s (Mangelsdorf, 1999). The initial focus was on quality control and in developing statistical methods and advanced measuring and test technologies with increasing degrees of automation and computerised techniques to select products of high quality in the factory. Later the growing complexity in products, services and in the key processes of a company made a broader approach necessary: product quality as a result of well-designed and controlled processes (Figure 2.1). In the middle of the 1980s, the international standards ISO 9000 series introduced the main principles of quality management in all branches. These standards focused on the involvement of the management for quality on controlled processes, in all core activities and on continuous improvement of all processes in the company. Over time, companies recognised the essentials of these ideas and learned to introduce a quality management system with its quality elements step by
step in their various processes in the factories, in development and engineering, as well as in sales and marketing.

The model based on time frame based evolution of TQM is a four stage model (Mangelsdorf, 1999). In this model there has been a phase of Quality Management where ISO 9000/14000 was evolved on 80s before the concept of TQM came into existence (figure 2.2).

Figure 2.1: Evolution towards TQM (Mangelsdorf, 1999)

Figure 2.2: Evolution from Quality Control to Total Quality Management (TQM) (Mangelsdorf, 1999)
2.3 Aims of TQM

While undertaking a research on the critical factors of implementing TQM, it is important to understand the aims and objectives of TQM in detail so that the study may be oriented towards the achievement of the same.

The International Academy of the American Society for Quality has defined TQM as: The management approach of an organization centered on quality, based on the participation of all of its members and aiming at long-term success through customer satisfaction and benefits to all members of the organization and to society (Harrington et al., 2012). The aims of TQM are to achieve customer satisfaction, cost effectiveness, and defect free work through a relentless pursuit of the "war on waste." The customer will be satisfied only if the product has a very low rate of defects (literally none or zero) and is competitive in price with offerings from other suppliers. TQM achieves customer satisfaction through focusing on process improvement, customer and supplier involvement, teamwork, training, and education. TQM is a culture advocating a total commitment to customer satisfaction, through continuous improvement and innovation in all aspects of the business. The customer, in the ideal culture, does not mean only the final recipient of the organization's end product or services. The "customer" is also every individual or department and stakeholder within the organization, commonly called as internal customer. These concepts are very much essential in the context of construction industry as it is not only knowledge intensive but involves the integration of several suppliers coordinating towards the achievement of common goal and demands a great deal of timing, coordination, planning, conflict resolution, communication and many other soft aspects of business.

2.4 Basic Elements of TQM

The central theme of this research lies in exploring the influence of critical factors of implementing TQM in Indian construction industries on the organizational performance and this necessitates a thorough literature review on the basic elements of TQM, which are the fundamental building blocks of the critical factors. The critical success factors may vary from industry to industry or based on the context of application, but the basic elements of TQM remain more or less the same.
The following sections discuss these basic elements as they constitute the basic building blocks to the critical factors based on which TQM implementation is explored in this research. The identification of these elements started about two decades back and following ten elements have been considered to be the basic elements.

2.4.1 Leadership and Management Commitment
All implementations should begin from the top of the pyramid viz., leadership and management commitment as it is the quintessential requirement for the success of any TQM program. Prior to management commitment, management should have a thorough understanding of TQM. This commitment must be coupled with support to make it happen as necessary resources such as time, money, energy and effort to facilitate improvement. Senior management, will have to develop a clear vision which is shared among the employees at all levels and the mission, objectives, strategies, policies, procedure, systems, practices and practices have to be developed and aligned to the vision.

An advisory committee is responsible for establishing and developing the policies and procedures for the TQM implementation process, which should be again the top management initiative. The responsibilities of the committee members include: determining the needs of the organization, looking for opportunities for improvement, and clear cut goals for improvement initiatives. TQM demands a lot of innovation on from the employees to do things differently; therefore, participation by management is essential. Change management can be difficult to start with, as it is usually resisted by the employees unless the benefits are not very clear to them and this demands a close communication between the top management and the employees though proper change agent. To achieve the changed behaviour of the staff and improve quality, it is very important to change the organizational environment. Many studies have revealed the fact that without these fundamental cultural changes, an organization’s attempt at TQM will fail (Bardoel & Sohal 1999; Mohamed & YuanJian, 2008; Salaheldin, 2009; and Harrington et al., 2012). This fundamental change can achieved only when management has a long-term obsession with quality work and continued improvement (Culp, 1993). So, leadership and
management commitment forms the main driving force to the implementation of TQM and forms the basic element of success.

There is also a contradicting view to the above notion that in the empirical section, there is no significant relation found between top management commitment and firm performance. This conflicts with notions by several authors (Lok et al., 2005; Monczka et al., 2005). So, there is a need for further investigation on this dimension of TQM in relation to its contribution to organizational performance.

2.4.2 Training

Education and training forms the fundamental element for any successful quality management program. All success stories of TQM implementation and success have been contributed to a great deal to training. TQM training builds human capital and provides employees with a foundation that prepares them to participate in a more decentralized organization (Wruck et al., 1998). Karia and Asaari (2006) have revealed through their studies that the training and education of employees have a significant positive effect on job involvement, job satisfaction and organizational commitment. Employees must be enabled to get knowledge about quality concepts, incorporate handling of quality tools and techniques, and have the right attitudes such as active listening, cooperation and compliance to be able to apply standards and a philosophy of continuous improvement in which they can participate. The training program must target everyone in the organization, since quality under the TQM is a collective responsibility. All employees from top management to bottom most should understand: the need for TQM, understand what TQM is, how it works, and its benefits. Orientation to the basic concepts and procedures of TQM is also vital. This provides employees with a fundamental knowledge about the basic building blocks of TQM, which can later be linked to more advanced and complex topics. TQM requires a participative, disciplined, and organized approach to improving process, thus team training is also very important as these skills need to be developed in a systematic manner. The training program should also cover the TQM tools such as cause-and-effect analysis, Pareto analysis, what-if analysis, quality function deployment, affinity diagrams, fishbone diagrams, team problem solving, interpersonal communication and interaction, rudimentary statistical methods, cost of quality measurement, and the collection and evaluation of quantitative information.
2.4.3 Communication

Communication barrier could pose a major problem to TQM implementation and its success, particularly in the context of construction industry, as it involves a totally diversified group of employees. Good communication is very important in achieving TQM levels of performance excellence as good communication will result in eliminating fear (Harrington, et al., 2012). Fear makes employees reluctant to voice their opinions or question policies, procedures, and decisions and the phenomenon is called 'group think' and is detrimental to the growth and success of the organization. Again, this requires a change in management behaviour and the employees should know the reasons for rejection of their work. The employees should also know the use and the importance of the work they produce. If the message is not clearly communicated to the employee, then this could bring down their performance which affects quality.

In the context of TQM, teamwork or coordination between departments is an important outcome and a condition for continuous improvement (Coyle-Shapiro, 1997) and this cannot be achieved without proper communication between sections and departments. TQM is a conscious process of improvement, and thus good communication between all the sections and a good feedback system are important to convey ideas to management and to initiate the necessary changes. Open lines of communication that allow direct access for any employee, at any level, to contact upper management regarding an idea for improvement or a particular concern has been effectively tried in various organizations (Harrington et al., 2012). Prior to adopting open lines of communication, employees and management should be trained in this system, if not, it will be an ineffective theoretical approach. It is very important that management reacts to the concerns and ideas of the employees and communicate the same in a convincing and an agreeable manner.

2.4.4 Teamwork

The success of a construction industry or its TQM implementation is largely dependent on teamwork because it involves a series of activities which are inter-related and interdependent with causal in nature. According to Kumar et al. (2009), TQM is one of the most popular and holistic approaches that seek to integrate all organizational functions to focus on meeting customer needs and organizational
objectives and it cannot succeed without a proper teamwork among the employees. Harrington et al., (2012) noticed that individuals working together in teams or groups toward common goals are generally more effective than individuals working alone, and also, the team approach should not be limited to the internal organization’s team, but it should cover vendors and external customers as a single entity of stakeholders in a business. In the context of TQM, teamwork or coordination between departments is an important outcome and a condition for continuous improvement (Coyle-Shapiro, 1997). Quality circles concept has been tried very successfully in many industries, which in essence, is to have collective awareness and efforts to achieve quality. The construction project team leader as a facilitator rather than an authority or an administrator would pave the way for success. Skills in such areas as communication, group dynamics, innovative spirit, statistical methods, synergistic approach, proactive attitude, open culture, problem-solving methods and techniques, and group leadership, could be very handy in managing the teams.

2.4.5 Customer Satisfaction
A group of researchers including Joseph et al., (1999) and Harrington et al., (2012) claim that the main objective of TQM is to achieve customer satisfaction whether the customer is internal (e.g. department in the same organization) or external (e.g. final product recipient). The first step in achieving customer satisfaction is to define the customer’s needs and wants and then translate these needs and wants into standards. Customer satisfaction should not be limited to meeting the customer’s expectations, but it should try to exceed them through continuous improvement. In order to meet the customer’s expectations, the organization must adopt an information-gathering program that measures the level of customer satisfaction. Such a program will help the organization to identify areas of dissatisfaction, so corrective action can be taken to eliminate the source of dissatisfaction.

Customer satisfaction is the driving force for an organization to improve its performance (Zairi, 2000; Lagrosen, 2001). Customer satisfaction requires the company’s quality improvement and the adoption of TQM principles such as customer focus and measurement of customer satisfaction (Fotopoulos and Psomas, 2009). Both external and internal customers have their specific needs. According to Rampersad (2001), to realize customer satisfaction, everyone within the organization
should consider continuous improvement as something normal. These studies merely underscore the importance of customer satisfaction as an important element of TQM.

According to the research undertaken by Khanna et al., (2011), Customer satisfaction was found to be an important measure of quality and implementation of TQM requires that great emphasis must be given on this parameter. This requires that there must be proper systems to receive and deal with customers’ complaints and the organization needs to systematically capture customer requirements and ensure satisfaction levels after sales.

Customer satisfaction in the construction industry can be achieved by implementing the following steps Harrington et al., (2012):

(1) make the customer (internal and external) aware of the organization’s quality management initiative;
(2) determine customer expectations;
(3) measure the customer’s degree of satisfaction; and
(4) take action to improve satisfaction.

2.4.6 TQM and Measurement
As quality Guru Edward Deming rightly put, that which cannot be quantified cannot be measured, and that which cannot be measured its quality cannot be improved. There are several parameters of interest in TQM which need to be measured and subject to continuous improvement. Customer satisfaction requires the company’s quality improvement and the adoption of TQM principles such as customer focus and measurement of customer satisfaction (Fotopoulos and Psomas, 2009). Harrington et al., (2012) have found that in order to discover the results of deploying a construction quality program and identifying the areas of future improvement, construction-related quality measures are necessary.

Under a construction industry TQ program, a number of measures can be used to verify and control the inputs and outputs in order to meet the customers’ (internal/external) requirements. The measurements provide the organization with baselines for current performance and the degree of improvement that may be required post implementation. For example, increasing the employees’ satisfaction with the intention of increasing construction project productivity requires measuring employees’ satisfaction and initial productivity (Harrington et al., 2012). Further, the
research claims that later, when the recommendations for the actions to improve both stakeholders' and employees' satisfaction are launched, both the satisfaction and productivity levels must be re-measured.

It is very important to examine the effectiveness of the construction project improvement activities during various stages of operation. The costs of increasing employee satisfaction versus the financial gains of the productivity increase may have to be studied. Improved communication, recognition, removing fear, and leading employees to work with pride result in an increase in employee satisfaction, which, in turn, materialize in their work quality and quantity (productivity). Furthermore, the satisfaction of the employee reflects on his attitude toward others namely his customers and this is important in some businesses (e.g. services) where the attitude of the employees is the marketing tool, particularly in knowledge intensive sectors.

Harrington et al., (2012) have enumerated a number of reasons for adopting construction project-related quality measurements:

- to be able to attain and sustain reasonable construction project objectives;
- to justify the use of construction project resources;
- to provide standards for establishing construction-related comparisons;
- to determine construction project priority areas that require improvement;
- to provide a scale to allow people (employees) to monitor their performance level;
- to identify construction-related quality problems; and
- to detect any decline in performance.

It should be noted that human resources (employees), process, external customers, suppliers, and other resources (material and equipment) form the main components of any organization, construction or otherwise. All these elements are governed by management and organization policies and procedures and the construction quality journey considers all these elements and tries to improve them on a continual basis.
2.4.7 Continuous Improvement

As Oswald and Burati (1992) put it, Total Quality Management is often termed a journey, not a destination for its very nature as a collection of improvement-centered processes and techniques, which are performed in a transformed management environment on a continual basis. The focus of TQM is on enabling employees to contribute meaningfully to the quality of processes and their continuous improvement (Khanna et al., 2011). The concept of "continuous improvement" holds that this environment must prevail for the life of the enterprise, and that the methods will become routinely used on a regular, recurring basis (Harrington et al., 2012).

Innovation and modern technology have great role to play in continuous improvement and management under TQM must be supportive to both. Deming’s (2000) "plan-do-check-act" (PDCA) cycle is a systematic procedure for improving methods and procedures by focussing on correcting and preventing defects, first time and every time. Avoiding defects by building in quality is usually less costly than the typical approach of attempting after the formation of it to determine defects through inspections and rectifying the same. The PDCA cycle is designed to maintain improvements and prevent deterioration.

Continuous improvement entails focussing on processes so that they can be changed to be more efficient. The degree of success can be determined by comparing the progress against the certain set of criteria. The process of measuring and comparing the degree of success against predetermined criteria is known as "benchmarking." Benchmarking is a systematic search for best practices that leads to superior performance (Harrington et al., 2012).

2.4.8 Process Improvement

Process improvement is basically an aspect of organizational development (OD) in which a series of actions are taken by a process owner to identify, analyse and improve existing business processes within an organization to meet new goals and objectives, such as increasing profits and performance, reducing costs and accelerating schedules (Sarah,1996). But these days it is a popular concept in TQM.

Process improvement and continuous improvement are complimentary processes and one cannot do without the other. In some literature, process
improvement is referred to as statistical methods or statistical process control because measurement and analysis of data are very important for process improvement (Harrington et al., 2012). Accurate, timely and precise data are vital for making better decisions regarding process improvement. The quality management team should consist of a representative from each area that might be involved in a process and the team has to identify and separate causes of quality problems and propose solutions. The proposed solutions should then be screened and the best solution should be selected for implementation so that not only the error is rectified but future occurrence of it is prevented. Subsequent performance should be measured and evaluated to determine if further action is necessary. The TQM tools such as histograms, cause-and-effect diagrams, affinity diagrams, check-list sheets, Pareto diagrams, failure mode evaluation and analysis, graphs, control charts, and scatter diagrams can be useful in constantly monitoring the process.

2.4.9 Focus on Employees

Focus on employee is nothing but empowerment. TQM views employee satisfaction as an essential factor in improving the contribution of each employee and considers the employees as internal customers with whom the company exchanges information and services (Harrington et al., 2012). TQM promotes the concept that employees are customers of each other, and hence, each employee should try to satisfy his or her internal customers.

Management should encourage suggestions and make the working environment open, so honest comments can be made without fear of punishment with group think phenomenon being completely eradicated. More specifically, management should collect information from all sources and implement a procedure for taking action on those suggestions so as to bring them to fruition. Failure of management to act on suggestions within a reasonable time will discourage employees from spending time in preparing their suggestions. Harrington et al., (2012) suggest that recognition and reward should be extended for valuable suggestions to the organization. It might be also helpful for an organization to conduct an employee survey to determine employee attitude about quality, management, safety, and working conditions. Such a survey will serve not only send a message to the employees that the management cares about the needs of its
employees, but also, it will identify areas that need to be improved. The survey can be conducted as a one-to-one interview or it can be a written survey. The result of the survey should be shared with top management and with employees and sharing the results with employees will indicate to the employees the management sincerity. Higher the management sincerity in implementing the suggestions of the employees greater will be the success of TQM.

2.4.10 Supplier Involvement

Deming emphasized the importance of maintaining special relations with suppliers. According to Littler et al. (1995) top management has to allocate resources supportive to the collaborative operation with suppliers. TQM recognizes that the quality of any stage in a process is dependent on the quality of the previous stage (Harrington et al., 2012). Thus, TQM pays attention to the suppliers or vendors of both labour and materials and maintaining close and long-term relationships with supplier’s results in achieving the best economy and quality. Having close working relationships with a small number of supplier’s means that each supplier can be given larger orders, which helps win their loyalty. Conducting frequent and routine visits, feedback session and other communications can help to enhance the relationship between the supplier and the organization. Maintaining a close relationship and open communication with the suppliers help them to have a good understanding and a feel for their customers’ requirements and will result in better products satisfying the needs of the organization.

2.5 Research on Critical Success Factors

The word critical success factors and critical factors are used interchangeably in TQM research and some researchers also address them as enablers. Those factors are basically important for the business either for implementation of TQM or its success as considered by the stake holders of business as they will provide the necessary requirements for quality product and customer satisfaction (Gotzamani et al., 2006). However, in this research they are considered as critical factors for TQM implementation. This because, TQM implementation is basically a latent variable and speaking in strict senses it cannot be measured. Its measurement should be through the indicators of TQM implementation which are basically these critical
factors and they must necessarily contribute to the success of TQM eventually. As this research is specifically seeking relationships on how far these factors are determining the business operation and performance in the context of Indian construction industry, it is vital to have a thorough review of all the critical factors identified by the researchers of TQM.

A series of critical factors have been identified by a group of researchers in TQM and they have been listed in Table 2.1

Table 2.1
(The Critical Factors/Enablers/Critical Success Factors of TQM Implementation)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Critical factors/enablers/CSFs</th>
<th>Authors</th>
</tr>
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<tbody>
<tr>
<td>2.</td>
<td>Employee training</td>
<td>Karia and Asaari (2006)</td>
</tr>
<tr>
<td>3.</td>
<td>Teamwork</td>
<td>Harrington et al., (2012)</td>
</tr>
<tr>
<td>5.</td>
<td>Coordination between departments</td>
<td>Coyle-Shapiro (1997)</td>
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<tr>
<td>14.</td>
<td>TQ measurement</td>
<td>Harrington et al., (2012)</td>
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<tr>
<td>15.</td>
<td>Continuous improvement</td>
<td>Harrington et al., (2012)</td>
</tr>
<tr>
<td>16.</td>
<td>Quality information systems and use of IT</td>
<td>Khanna et al. (2011)</td>
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</table>
While there are many other research listing several other factors, in the context of construction industry the above ones are quite relevant and considered for evaluation and selection of critical factors in the present research.

2.6 Relevance of TQM to Construction Industry

The TQM concepts have originally been developed for the manufacturing industry with a focus to minimize variance in production process, thus reduce defects and increase customer satisfaction. As one of the main objectives of the TQM concept is to achieve customer satisfaction and the concepts are applicable to any other product or service sector including construction firms. However, the implementation of TQM might differ from significantly from one industry to another as the processes involved are different.

The construction industry differs from the manufacturing in many different ways and that makes introducing TQM more challenging. While the manufacturing industry is characterized by well-established processes, in the construction industry each commissioning of the project is usually a onetime process where individual processes are completely disintegrated from each other. According to Harrington et al., (2012), construction industry is unique in the following ways:

(1) the mobility of staff;
(2) diversity in the types, forms, and shapes of construction projects;
(3) geographical dispersion;
(4) the contractual relationships;
(5) frequent prototyping of projects; and
(6) the subtle forms of waste that often go unnoticed.

In a country like India which is geographically very much widespread, mobility of staff is a major issue and would pose unique challenges in construction industry vis-à-vis the manufacturing industry. The common observation is identifying the talent and retaining the same. Unity in diversity is the slogan of the country and as the people are of diversified background their tastes, lifestyles and communication styles too differ and accordingly the construction projects also differ to a great deal. The same construction company may have to consider different types of materials,
planning and design specifications while dealing with the infrastructure development in two different states in the country. So, the five physiographic regions: The northern mountains, Northern Plains, The Peninsular Plateau, Coastal Plains, and the Islands would all differ in their design of infrastructure on multiple exogenous variables from soil strength to climatic conditions. The contractual relationships also play a significant role in the construction industry performance in contrast to the manufacturing. The frequency of prototyping would be higher in construction industry in comparison to that of manufacturing as tastes of infrastructure are much diversified in comparison to consumables or utility items manufactured. The forms of waste in manufacturing can be clearly categorized, whereas, in construction industry it is relatively difficult owing to the fact that the processes are not as streamlines as in manufacturing. So, it is clear that the TQM system which has been developed for a manufacturing set-up cannot be directly emulated into construction industry but needs to be modified and crafted to the specific requirements much different from those in manufacturing.

Jaafari (2001) rightly points out that construction industry has tended to confuse TQM with quality control (QC) and quality assurance (QA), believing that compliance with QA standards such as ISO 9001 and 9002 is all that there is to the application of TQM on construction projects. QA and QC do not represent the only elements of TQM, as it is a much more comprehensive and broader concept. QA and QC are applied during project implementation while TQM is a strategic philosophy adopted by an organization and implemented on a continuous basis, even if the organization is waiting to perform a new project.

Cultural issues are very significant while comparing the manufacturing sector to the construction industry. The quality culture varies from one company to another and from one industry to another despite the fact that it aims to achieve common objectives: namely, removal of waste, reduction of costs, improvement of reputation, enhanced customer satisfaction and better market standing/share.

2.7 Benefits of TQM to Construction Industry

When so much of time, effort, money, and energy are spent on implementing TQM in construction industry, the fundamental doubt that would arise in the mind of many would be, "Is it really worth the effort?" There have been a good number of studies
supporting the TQM implementation and its benefits and few criticisms too. One of the major criticisms of TQM is by Kanter (1985) who claims that it is in fact very difficult to implement TQM. Grint (1997) takes a philosophical approach to criticize TQM and argues that TQM is accepted and cited several times not because they may be evaluated as objectively good ideas but because they are fashionable ideas. He reiterates that after TQM fades out of fashion, it will be interesting to see to what extent the philosophy is maintained within organization that adopted it, and it is this which will prove, whether or not, TQM is a ‘fad’ or it is objectively a good idea. Yong and Wilkinson (1999) claim through their research that TQM has been only partially achieved in most of the organisations and has not been successful. They even bring out the reasons for failure of TQM that lack of commitment, action and responsibility from all tiers of the workforce, has led to this failure. In addition to these factors they argue that high labour turnover, cultural issues, and barriers created by quality certification and measurement issues have also proved to be problematic for the organizations that have been trying to imbibe TQM. Bergquist and Ramsing (1999) and Przasnyski & Tai (1999) argue that it is difficult to establish relationship between TQM and improved performance in companies. Eskildson (1994) and Harari (1997) claim that TQM programmes are ineffective.

In direct contrast to the above, a group of researchers claim that TQM programmes are resulting in improved performance (Lemak and Reed, 1997; Hendricks & Singhal, 1997 and Handsfield et al., 1998). So, this section basically highlights the benefits of TQM to construction industry. Harrington et al., (2012) a strong proponent of TQM in construction industry opines that in order to appreciate the importance of TQM and to have a feel for its impact, the benefits of TQM to the organization should be known. Bardoel and Sohal (1999) reported the benefits achieved adopting TQM in seven Australian construction organizations based on case study research. The reported benefits are:

- better control of processes resulting in consistency from design through to delivery;
- reduced construction cycle time;
- a reduction in the quantity of goods damaged in transit and construction;
- reduced delivery time to the site;
- decreased fallout of chemicals;
• increased measurement of performance; and
• improvement in customer perceptions of the company.

However, many of the major benefits of a TQM program have not been achieved in construction, such as the increased awareness and focus of all employees on satisfying internal and external customers. Management objectives such as customer satisfaction, meeting specifications, larger market share, higher productivity, zero defects, present increase in sale, and present decrease in costs can be achieved by embodying TQM ethics in all aspects of the organization, and those objectives become a natural consequence on a long run and are yet to be proved in the construction industry.

2.8 Issues of Implementation of TQM in Construction Industry

With all the praise as well as criticisms on TQM discussed in the previous section the main issue with TQM is the difficulty in its implementation. So, in this section a discussion on some of the implementation issues has been reviewed for better understanding the issues. Some of the construction problems such as fluctuation of demand and custom work (non-steady state) create difficulties in TQM implementation and TQM could only help organizations cope with such fluctuations (Harrington et al., 2012). In other words, while TQM could be a solution for the construction industry problems, some of the construction industry problems are themselves obstacles for TQM implementation and acts like a catch twenty two situation.

Barrier caused by traditional or conventional practice forms one of the major difficulties preventing wider implementation and acceptance of TQM in the construction industry. To better explain this fact, Harrington et al., (2012) gives the example of the traditional way in which project bids are evaluated with the heaviest emphasis on price. It is widely known that the client usually selects the contractor based mainly on the lowest price with less consideration for past experience, current workload, and reputation for quality leaving the contractors with no incentive to adopt TQM principles.

The long-term nature of a successful TQM implementation also creates a major problem, especially in the construction industry. The sudden change of the market, for example, that threatens the existence of the contractor could redirect the
firm from the long-term objectives to the urgent corrective actions. The construction industry is known for its fluctuations, which has the effect of making construction firms reactive rather than proactive because its demand is directly tied with the performance of the other major industries of the country and its economy.

The organizational culture change is the fundamental requirement for the implementation of TQM into an organization. Changing an organization’s culture is a very difficult task, which often faces resistance. The challenge of implementing TQM results from the fact that TQM is not a slogan, nor a tool, nor a program; it is an organization paradigm. The concept of TQM is broad enough to be the framework or foundation of an organization’s culture. Therefore, implementing TQM might deal with replacing, not just modifying, and the organization’s culture. Furthermore, the transformation from the traditional western paradigm to the more eastern TQM paradigm is a radical change.

Lakhe and Mohanty (1994) in a case of a TQM implementation in a company located in Mumbai, India demonstrated the following major obstacles in implementing TQM:

- inadequate knowledge and information about TQM;
- doubts of employees about management’s intentions;
- failure of management to maintain interest and commitment over a long period;
- difficulty in measuring the effectiveness of TQM;
- poor internal communication;
- difficulty in assessing customer expectations and satisfaction; and
- insufficient training resources.

Among the other difficulties in implementing TQM is the failure to have some means of monitoring and managing the overall progress of the TQM implementation. In addition, the failure to provide training skills immediately before TQM is another cause of TQM implementation difficulty. Finally, regarding TQM only as an internal process and thus failing to involve suppliers, subcontractors, and others in the process chain creates a major difficulty in implementing TQM in Indian context.
2.9 Contemporary Research of TQM in Construction Industry

There are different streams of research in TQM in construction industry. Low and Peh (1996) emphasize that in developing a total quality culture in construction, one important step is to develop a construction team of a main contractor and subcontractors who would commit to the quality process and develop a true quality attitude. Thus, the main contractor should only select subcontractors who have demonstrated quality attitude and work performance on previous jobs. They have outlined the following basic steps to implementing TQM in construction projects:

1. obtain the commitment of the client to quality;
2. generate awareness, educate, and change the attitudes of staff;
3. develop a process approach toward TQM;
4. prepare project quality plans for all levels of work;
5. institute continuous improvement;
6. promote staff participation and contribution using quality control circles and motivation programs; and
7. review quality plans and measure performance.

Burati and Oswald (1993) have given three distinct phases for TQM implementation in an organization: 1) The exploration and commitment phase, 2) the planning and preparation phase, and 3) the implementation phase. Chileshe (1996) identified that most organizations in the construction industry were reluctant to implement TQM because they felt that the ISO 9000 was enough and that they did not want to subject their employees to anymore “cultural shock.”

Love et al. (2000) noted that organizations in the construction industry have abstained from implementing TQM practices because they feel that the short-term benefits are relatively minimal. Due to the complex nature and ever-changing environment of construction projects, Biggar (1990) suggested that the management system must be flexible, sensitive to effective communication, and continually improving. Mohrman et al. (1995) established a correlation between various market conditions and the application of TQM practices in construction industry and found that competitive pressures will lead to the adoption of TQM. They suggest that organizations should create supplier partnerships by choosing suppliers based on quality rather than price.
Pheng and Teo (2004) have identified that product diversity, organizational stability, and misconception of cost of quality cause some sort of resistance for TQM implementation. Due to uniqueness of structures in the buildings and features which meet the personalized needs of the customers there is little scope for flexibility and diversity in each of the project. But the diversity is very large from project to project in construction. In terms of organizational stability, the construction industry has a high number of organizational collapses, especially during a downturn in the economy (Sommerville & Robertson, 2000). Thus, commitment toward TQM strategies and policies that may take several years to provide pay-offs may be perceived as futile or a misdirection of resources. As compared to the head office, the building site is transitory. Teams specially formed for a project may cease to exist after contractual obligations end and this makes the staff lose continuity. Costs in the construction industry are being compounded by prevention and appraisal costs are coupled with non-conformance costs. Contractors often perceive TQM as an extra cost, but they do not realize that it is not the quality that costs but rather the non-conformance to quality that is expensive. The sources of costs associated with the non-achievement of quality include the costs of rework, correcting errors, reacting to customer complaints, having deficient project budgets due to poor planning, and missing deadlines (Culp, 1993). Biggar (1990) pointed out that the costs incurred from not achieving quality can cost owners up to 12% of the total project cost.

2.10 Summary of Literature Review and Research Gap
The review of literature has given a thorough understanding of the issues about the TQM implementation in construction industry. There are several streams of TQM research which have different focus altogether. While there are supporters of the TQM concept and constantly strive to achieve success through identifying the critical success factors of TQM implementation, there are quite a good number of researchers who claim that TQM projects have failed to achieve performance and empirically found that there is no evidence to say that business performance is linked to TQM. Some researchers have even pointed that TQM implementation is just for the name of it rather than the derived benefit and like other jargons, once it is out of fashion the whole concept will vanish without a trace.
So, there is enough scope to undertake a focussed research in any of the streams related to TQM. It could be either planning for TQM or the implementation aspects of it. The literature has indicated that while there are different operational definitions of TQM it is possible to arrive at a common set of characteristics and features of TQM. From the days of TQM evolution most of the quality gurus agreed with the six basic elements of TQM: customer satisfaction, cost reduction, leadership and top management commitment, training and education, teamwork, and organisational culture. Gap exists in the availability of focussed research findings on each of these basic elements on how implementation strategy of TQM can be designed so as to optimize these variables under the constraints of resources in various forms and meeting the objective function or corporate objective of business in the form of increased profit or decreased cost.

Having identified this gap, if the research focus is directed towards TQM implementation alone, there is a clear path of research opening up for an exploratory study with qualitative as well as empirical approach, to narrow down to select number of critical factors of TQM implementation and establish relationship between these factors and organizational performance, both in terms of financial and non-financial performance. In the study thus formulated, operational performance could be either intervening variable, or even, mediating variable between the exogenous and endogenous variables.

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